

Water Recovery for Regenerative Life Support Systems, Phase II

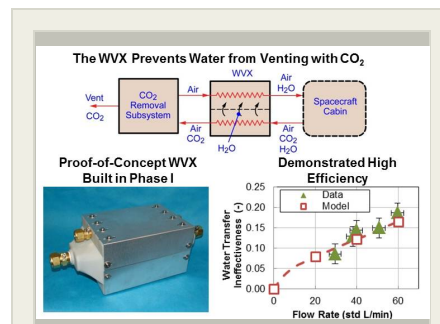
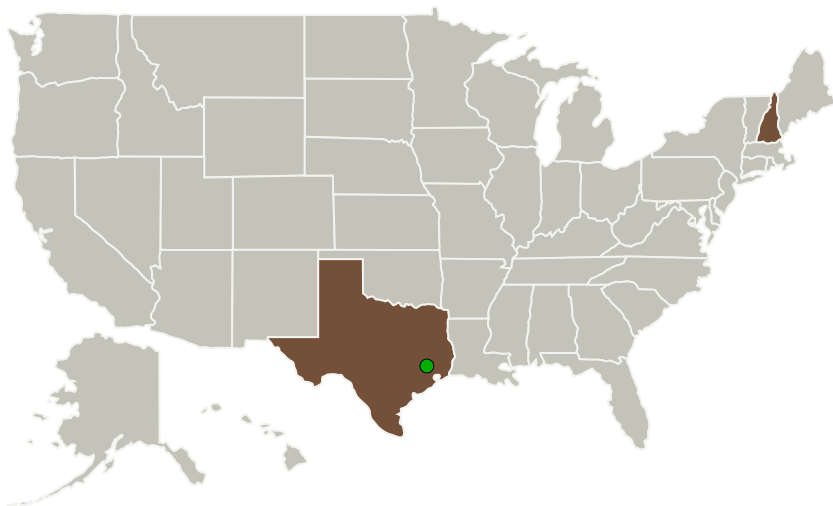


Completed Technology Project (2013 - 2016)

Project Introduction

Thermal and environmental control systems for future exploration spacecraft must meet challenging requirements for efficient operation and conservation of resources. Regenerative CO₂ removal systems are attractive for these missions because they do not use consumable CO₂ absorbers. However, these systems also absorb and vent water to space along with the carbon dioxide. We propose to develop an innovative water recovery system that minimizes water lost from regenerative CO₂ control systems without the need for low-temperature condensing heat exchangers. This approach addresses the need for water recovery systems in long-duration missions, reduces the need for consumables by enabling use of state-of-the-art regenerative CO₂ removal systems, and minimizes demands on the spacecraft thermal control system. In Phase I we proved the feasibility of our approach through proof-of-concept tests that demonstrated efficient water recovery from a compact exchanger with low pressure losses. Trade-off studies using our mass transfer analysis models have yielded a design for a full-size prototype that meets all the requirements for service on future spacecraft. In Phase II we will build the prototype and measure its performance in ground tests of a full-scale, regenerative CO₂ removal system.

Primary U.S. Work Locations and Key Partners



Water Recovery for Regenerative Life Support Systems Project Image

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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations

New Hampshire	Texas
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Project Transitions

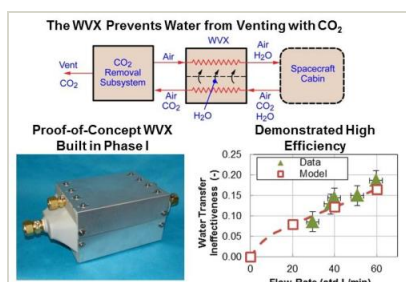
▶ **July 2013:** Project Start

✓ **January 2016:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137330>)

Images



Project Image

Water Recovery for Regenerative Life Support Systems Project Image
(<https://techport.nasa.gov/image/131999>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael G Izenson

Co-Investigator:

Michael Izenson

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Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
 - └ TX06.1.1 Atmosphere Revitalization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System